

**Report of the Ecological Issues Breakout Session
US/China Water Resources Management Conference
Tucson, AZ**

First Draft 4/21/99

The breakout session on Ecological Issues in Water Resources Management was held on April 20-21, 1999. It was co-chaired by Dr. Changming LIU, Professor and Academician, the Chinese Academy of Sciences, and Dr. Barry D. Gold, Acting Chief, Grand Canyon Monitoring and Research Center, US Department of the Interior, each of whom made introductory remarks about the topic during the conference plenary meeting. Presentations during the breakout session were made by six speakers from the People's Republic of China and six speakers from the United States. Three additional papers were submitted by the participants from the Peoples Republic of China.

The presentations and papers covered a broad range of issues including:

- ✧ Environmental Issues and the South-North Water Transfer Scheme in China
- ✧ Adaptive Management: A Promising Approach to Addressing Ecological Issues in Water Resources Management
- ✧ Water Resources Development and Utilization in the Yangtze Valley
- ✧ South Florida Ecosystem Restoration
- ✧ Water and Soil Erosion and their Control Measures in China
- ✧ Watershed Restoration Efforts in Oregon
- ✧ Flood Prone Areas and their Management on the Lower Reach of the Yellow River
- ✧ The Chesapeake Bay Program
- ✧ Managing Sustainable Use of Land and Water under Dry, Sub-Humid Climate
- ✧ Controlled Flooding of the Colorado River and Adaptive Management
- ✧ Groundwater Resources Exploitation in China
- ✧ The USGS NAWQA Program: An Ecological Perspective
- ✧ Conservation and Research on Waterfowl and their Habitats in China
- ✧ Function, Value, and Vulnerability of Wetland Habitat

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Both countries have the goal of managing and using water resources to meet the needs of their people while maintaining environmental integrity and preserving and protecting valuable habitats. While this requires that development needs be balanced with environmental protection, there was a recognition by both sides that the two countries are in different stages of economic development and may approach environmental protection differently.

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Sustainable development was acknowledged to be a common goal. The need for employing a watershed planning approach and the value of maximizing the use of natural

functions in water resources management was recognized. Techniques and principles such as buffers, use of non-invasive species for re-vegetation, the value of riparian vegetation, and the utility of indicator species were discussed. The group acknowledged that high population densities complicate land-use planning but that ecological restoration programs are much more costly over time than good pre-development planning which can balance food production, flood protection, and other human development needs with maintenance of ecological functioning.

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There was agreement that the following were among the most critical ecological issues related to water resources management:

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- ✳ Provision of high quality water for food production and irrigated agriculture
- ✳ Protection of people and structures from floods coupled with adequate flood warning and post-flood restoration
- ✳ Loss of fish and aquatic species and restoration of healthy populations of aquatic organisms
- ✳ Provision of potable water and quality water for other uses, including aquatic species
- ✳ Prevention of erosion and control of sedimentation
- ✳ Monitoring land-use/cover change and associated environmental/ecological impact
- ✳ Protection of riparian ecosystems
- ✳ Mitigating the effects of aquaculture on wetlands
- ✳ Prevention (preferably reversal) of desertification and wind erosion
- ✳ Prevention of water loss and drying of wetlands and river deltas
- ✳ Monitoring ecological indicators to guide management
- ✳ Predicting ecological change
- ✳ Educating the public and raising public awareness of ecological issues
- ✳ Preventing the loss of biodiversity
- ✳ Assessing and predicting global change
- ✳ Minimizing extreme water quality and quantity conditions
- ✳ Reversing deforestation and practicing sound forest conservation
- ✳ Evaluating water management policies to balance human health protection and development needs with ecosystem health

Opportunities for future collaboration were discussed and the group agreed that collaboration must be mutual (a "two-way street") and include both ecological and resource economics considerations. Suggestions included:

1. ✳Scientist-to-scientist collaboration on GIS and information systems, with commercial cooperation and perhaps a case-study or site-specific approach
2. ✳Monitoring and assessment technology, modeling systems and predictive/ forecasting approaches
3. ✳Techniques and ideas underlying ecological inventories

4. ✱ Cooperation on monitoring and GIS technology, including more precise remote sensing data planning for water and soil protection
5. ✱ Planning for water and soil protection
6. ✱ Technology to reinforce dam strength and collaboration on improving flood-warning networks
7. ✱ Flood insurance/reinsurance
8. ✱ Paired basin watershed research and monitoring
9. ✱ Exchange of views on ecological assessment objectives and applications
10. ✱ Desertification assessment with development of biological and engineering solutions
11. ✱ Water and soil conservation cooperation involving remote sensing, model creation, long-term monitoring approaches and training/exchange of experts
12. ✱ Wetland collaboration might entail establishing paired sites for land use/land cover mapping of managed and undisturbed areas, collection of data for GIS layers, remote sensing and monitoring, and development of decision-support models for managers

Our group recommends that the following six topics may be more critical for ecological support and might be taken as priority fields for initial phase of US-China cooperation.

- ✱ Techniques and ideas underlying ecological inventories
- ✱ Paired basin watershed research and monitoring
- ✱ Exchange of views on ecological assessment objectives and applications
- ✱ Desertification assessment with development of biological and engineering solutions
- ✱ Water and soil conservation cooperation involving remote sensing, model creation, long-term monitoring approaches, and training/exchange of experts
- ✱ Wetland collaboration might entail establishing paired sites for land use/land cover mapping of managed and undisturbed areas, collection of data for GIS layers, remote sensing and monitoring, and development of decision-support models for managers.